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Delpydora (Sapotaceae), its taxonomy and myrmecophily

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Summary : The African genus *Delpydora* of the *Sapotaceae* is revised taxonomically. The flowers hitherto described as bisexual are shown to be primarily unisexual. Full descriptions of the two species are given and their distributions illustrated. Gabon may be considered as the centre of diversity for the genus. The presence or absence of ant pouches in the leaves is discussed in relation with similar provisions in other African plant species. The geographical distribution of taxa possessing these structures is remarkable, being mainly confined to Central Africa.

Résumé : Une révision taxonomique du genre Africain *Delpydora* (*Sapotaceae*) est présentée. Il est apparu que les fleurs décrites jusqu'à présent comme bisexuées sont principalement unisexuées. La description détaillée des deux espèces ainsi que des cartes de distribution sont présentées. Le Gabon peut être considéré comme le centre de diversification du genre. La présence ou l'absence de poches à fourmis dans les feuilles est discutée en liaison avec l'existence de structures similaires chez d'autres espèces. La répartition géographique des espèces possédant ce type de structure est remarquable, étant essentiellement limitée à l'Afrique Centrale.

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INTRODUCTION

Delpydora was described in 1896 by PIERRE who based it on a collection of KLAINE from the surroundings of Libreville, Gabon. The type *D. macrophylla* remained its only species until 1917 when CHEVALIER described *D. gracilis* from Côte d'Ivoire. The latter species had no ant pouches in its leaves whereas *D. macrophylla* was characterized by their presence.

Botanical exploration of Gabon during the last ten years not only revealed the presence of the West African *D. gracilis* in Gabon, but also indicated that this species could produce distinct ant pouches there. Further investigation showed that *D. macrophylla* on the other hand is not always constant in producing ant pouches. More analysis thus seemed to be necessary in order to clarify the distinction between the two species. It was then decided to make a complete revision of this small African genus of *Sapotaceae*. A survey was made of foliar ant pouches in tropical African plants in order to show their distribution and their reliability as a character for distinction at the species level.

NOTES ON THE DISTRIBUTION AND TAXONOMIC SIGNIFICANCE OF FOLIAR ANT POUCHES IN AFRICAN PLANTS

Ant provisions in tropical plants occur in several families and although this feature is more prevalent in some groups than others, it does not appear to be of any taxonomic significance at the family level. The same holds for the generic level, even for a genus such as *Barteria* (*Passifloraceae*) of which most species do accommodate ants in their lateral shoots. So far ant provisions are exclusively known of species and hence it is likely that they will play a role of taxonomic importance at the specific level or below it.

The type of provisions is manifold, ranging from unprotected extra floral nectaries to special provisions in branches, stipules and leaves where ants can be housed. The relations between the plant and the ant are also very variable. A good and useful survey of ant-plant relations is given by BEQUAERT (1922).

The modifications plants produce to accommodate ants in their foliar organs i.e. in stipules and leaves have been surveyed for tropical Africa (Table 1). These so-called ant pouches are usually very distinct, but sometimes transitions or intermediary stages do occur which make it difficult to decide whether the provision is present or not. It is not known whether all the provisions summarized in Table 1 are used by ants for shelter or as nests as in *Diospyros conocarpa* and in *Dactyladenia sp. nov.* Some of them seem to function only as a protection for the extra floral nectaries they bear as in *Gardenia imperialis* or in *Magnistipula bimarsupiata*.

The survey is based on the material conserved in the herbaria of BR, K, P, and WAG. It does not pretend to be complete, neither in the enumeration of the species which show these ant provisions, nor in the distribution of the species concerned. Nevertheless, some conclusions may be drawn.

The phenomenon of ant pouches almost exclusively occurs in Lower Guinea and Congolia, with a centre of diversity in western Central Africa. It would be very interesting to see whether the geographical distribution of these ant provisions corresponds with the distribution of ant species which play a role in this ant-plant relation.

Within a species ant pouches are usually constant in appearance with the exception of the two *Delpydora* species and *Cola marsupium*. This means that these organs may be useful in specific delimitation, at least in specific distinction. *Diospyros conocarpa* is a special case, as entire leaves, which remained small, are folded to serve for ant housing.

DELPYDORA Pierre

Bull. Soc. Linn. Paris 2 :1275 (1896) ; ENGLER, Monogr. Afr. Pflanzenf. 8 : 49 (1904) ; THONNER, Blütenpflanz. Afr. : 448 (1908) ; LECOMTE, Bull. Mus. Hist. Nat. 24 : 455 (1918) ; BAEHNI, Candollea 7 : 433 (1938) ; AUBRÉVILLE, Flore Gabon 1 : 136 (1961) ; Flore Cameroun 2 : 17 (1964), in key to the genera only ; PENNINGTON, Genera Sapotaceae : 227 (1991).

TABLE 1 : Foliar ant pouches in some african plants.

Family and species ; kind of provision.	Country, total number of specimens investigated and presence/absence of provisions.	Observations.
Chrysobalanaceae <i>Dactyladenia, sp. nov.</i> (Rosaceae) Stipules transformed into pouches.	Gabon 5 - 5 / 0	A new species to be published by J.-J. FLORET (P).
<i>Magnistipula bimarsupiata</i> Letouzey Two pouches at base of leafblade.	Gabon 3 - 3 / 0	-
Dichapetalaceae <i>Dichapetalum gassitae</i> Bret. Two pouches at base of leafblade.	Gabon 1 - 1 / 0	-
Ebenaceae <i>Diospyros conocarpa</i> Gürke & K. Schum. Small leaves folded along the midrib.	Angola 1 - 0 / 1 Cameroun 40 - 28 / 12 Congo 12 - 11 / 1 Eq. Guinea 1 - 0 / 1 Gabon 32 - 21 / 11 Nigeria 6 - 6 / 0 Zaire 12 - 8 / 4	The provisions can be present on one branch and be absent on another one.
Euphorbiaceae <i>Macaranga saccifera</i> Pax Stipules transformed into pouches.	Cameroun 3 - 3 / 0 Congo 7 - 7 / 0 Gabon 4 - 4 / 0 RCA 3 - 3 / 0 Zaire 64 - 64 / 0	
<i>Uapaca staudtii</i> Pax Stipules ± transformed into pouches.	Cameroun 24 - 17 / 7 Gabon 3 - 3 / 0 Nigeria 4 - 4 / 0	Stipules often already shed from older, flowering or fruiting branches.
Rubiaceae <i>Gardenia imperialis</i> K. Schum.	Angola 7 - 7 / 0 Burkina Faso 1 - 1 / 0 Burundi 5 - 5 / 0 Cameroun 24 - 24 / 0 Congo 4 - 4 / 0 Gabon 9 - 9 / 0 Ghana 3 - 2 / 1 Guinea 8 - 7 / 1 Guinée Bissau 2 - 1 / 1 Ivory Coast 9 - 8 / 1 Liberia 1 - 1 / 0 Malawi 8 - 8 / 0 Mali 2 - 2 / 0 Nigeria 18 - 17 / 1 RCA 7 - 5 / 2 Sénégal 1 - 1 / 0 Sierra Leone 6 - 4 / 2 Tanzania 11 - 11 / 0 Uganda 9 - 9 / 0 Zaire 104 - 95 / 9 Zambia 10 - 10 / 0 Zimbabwe 3 - 3 / 0	Leaves of young branchlets may be without pouches.
<i>Ixora hippoperifera</i> Bremek. Two pouches at base of leafblade.	Cameroun 18 - 18 / 0 Gabon 8 - 8 / 0 Nigeria 2 - 2 / 0	
<i>Leptactina mannii</i> Hook. f. Stipules transformed into pouches.	Cameroun 10 - 10 / 0 Congo 6 - 6 / 0 Gabon 29 - 29 / 0	
Sapotaceae <i>Delpyhora gracilis</i> A. Chev. Two pouches at base of leafblade.	Cameroun 2 - 0 / 2 Congo 1 - 1 / 0 Gabon 3 - 1 / 2 Ghana 5 - 0 / 5 Ivory Coast 3 - 0 / 3 Liberia 13 - 0 / 13	
<i>Delpyhora macrophylla</i> Pierre Two pouches at base of leafblade.	Cameroun 7 - 7 / 0 Congo 1 - 1 / 0 Gabon 16 - 15 / 1	
Sterculiaceae <i>Cola marsupium</i> K. Schum. Two pouches at base of leafblade.	Cameroun 20 - 9 / 11 Congo 5 - 4 / 1 Eq. Guinea 1 - 1 / 0 Gabon 14 - 14 / 0 Nigeria 2 - 0 / 2 Zaire 52 - 48 / 4	
<i>Scaphopetalum dewevrei</i> De Wild. & Dur. One poche at base of leafblade.	Zaire 81 - 81 / 0	This taxon is not very distinct from the following. One species ?
<i>Scaphopetalum thonneri</i> De Wild. & Dur. One poche at base of leafblade.	Cameroun 21 - 21 / 0 Congo 6 - 6 / 0 Gabon 27 - 27 / 0 Zaire 17 - 17 / 0	See above under <i>S. dewevrei</i> .

TYPE SPECIES : *Delpydora macrophylla* Pierre.

Unbranched or scarcely branched shrub to treelet, usually with latex at least with lactifers (see note). Stipules absent. Indumentum of usually long, \pm stiff, simple hairs, very sparsely intermixed with 2-branched hairs with very unequal arms. Leaves spirally arranged, with numerous, distinct, rather close parallel nerves, with sparse, very small pellucid dots and/or streaks, with or without ant pouches at the base of the lamina.

Flowers fasciculate, axillary or ramiflorous, unisexual, monoecious or dioecious, without staminodes, the male flowers lacking the stigmas on the style, the females with a pistil only. Calyx of 5 free sepals, hairy outside. Corolla tubular, glabrous, the tube longer than the erect lobes. Stamens 5, glabrous, inserted in the lower half of the corolla tube, opposite the lobes, usually slightly shorter than the corolla ; anthers extrorse, connivent around the style. Disk absent. Pistil ca. as long as the corolla ; ovary 5-locular, hairs on the ovary distinctly shorter in the male flowers than in the female flowers.

Fruit (depressed) globose, hispid-hairy, up to 5-seeded. Seed sub-ellipsoid, with a long linear, adaxial to basal scar ; testa thin, coriaceous to pergamentaceous ; cotyledons plano-convex, endosperm absent.

DISTRIBUTION. — Two species in the rain forests of West Africa and western Central Africa.

NOTES. — The prevailing habit of *Delpydora* is that of an unbranched shrub or treelet, up to 7 m tall, never reaching the size of a small tree. Branching does occur, but is rather rare, and is mostly seen in older individuals only.

Latex is usually present in the branches and leaves, often abundantly so in flowering individuals, but it may not show at all in specimens collected at the end of the dry season as was observed in the field by the first author (e.g. *Breteler 12026*). Lactifers were present, however.

PENNINGTON (*l.c.*) described the indumentum as consisting of long simple hairs only, and considered this an important character for generic distinction. Although the hairs are nearly always simple, 2-branched hairs do occur, but they are rare. They have been observed on the vegetative parts as well as on the outside of the sepals as indicated is the drawing by DELPY (see below).

All the authors cited above described the flowers of *Delpydora* as bisexual or considered them to be hermaphrodite. Recent observations show, however, that the flowers are always unisexual, although those that are functionally male only lack stigmas. This was drawn by DELPY in 1896, who depicted two style types i.e. with and without stigmas, as observed on *Klaine 436*. Copies of his drawing were distributed by PIERRE, probably together with duplicates of the type, at least to Berlin (B), Brussels (BR), Kew (K), and probably also to St. Petersburg (LE). Investigation also revealed that the male flowers have distinctly shorter hairs on their ovaries than on female flowers, but this character is not very prominent.

Most collections proved to be either male or female, i.e. unisexual, but there are a few in both species (*Leeuwenberg 4883* and *Letouzey 9468* of *D. gracilis* ; *Breteler 6740*, *Klaine 436* and *Le Testu 8349* of *D. macrophylla*) which contain male as well as female flowers or fruits. It is not known, however, whether in all these cases the material has been collected from a single individual (flowers were often found preserved separately in a convolute). From at least two of these collections (*Breteler 6740* and *Letouzey 9468*), however, it is sure that male and female elements came from the same individual. From this it must be concluded that the unisexual flowers can be dioecious or monoecious. The same

has been reported by WHITE (1983 : 249) for *Diospyros* and *Euclea* of the *Ebenaceae*. His statement that male plants occasionally can produce functional female flowers and viable seed, is not in accordance with the ratio between male and female individuals found in the species of *Delpyhora* (see notes with the treatments of the two species). In this genus it is more likely to assume that the female plants occasionally do produce male flowers as well.

KEY TO THE SPECIES

- Shrub up to ca. 1.80 m tall ; leaves 12-30(-37) × 5-9(-11) cm, with 15-25(-30) pairs of main lateral nerves ; flowers 4.5-7.5 mm long. West Africa and western Central Africa *D. gracilis*
Shrub - treelet up to 7 m tall ; leaves (10-)25-42(-78) × 5-16 cm, with (22-) 26-43 pairs of main lateral nerves ; flowers 10-13 mm long. Western Central Africa *D. macrophylla*

NOTES. — The presence or absence of leaf pouches was hitherto the primary character used to distinguish these two species. Moreover, *D. gracilis* was thought to be restricted to West Africa, West of the Dahomey gap, while *D. macrophylla* was confined to Gabon. New collections have revealed that the pouch character is not diagnostic and that both species have a much wider distribution.

In almost all aspects *D. gracilis* is smaller than *D. macrophylla* : it is smaller in habit and it has smaller leaves, flowers, and seeds. There is no character of qualitative nature to distinguish between the two species. Could *D. macrophylla* be a polyploid of *D. gracilis* ?

***Delpyhora gracilis* A. Chev. — Fig. 1, 1-5 ; Map 1.**

Mém. Soc. Bot. France, 2, 8 : 263 (1917) ; Expl. Bot. Afr. Occ. Franç. 1 : 394 (1920) ; HUTCHINSON & DALZIEL, F.W.T.A. 2 (1) : 11 (1931), based on A. CHEV. (1920) as "name only" ; Kew Bull. 1937 : 58 (1937), as "*D. gracilis* A. Chev. ex Hutch. & J.M. Dalz".

TYPE : *Chevalier 19583* ('*Clozelia gracilis* A. Chev.', *nomen*), Côte d'Ivoire, Cavally basin, between Loula and Nekaougnié (holo-, P ; iso -, K, fragment only).

Small shrub up to 1.80 m tall. Branches and branchlets brown-hirsute. Leaves usually without ant pouches ; petiole (4-)5 - 10(-16) mm long, hirsute, grooved above ; lamina oblanceolate, 12-30(-37) × 5-9(-11) cm, 2-4(-5) times as long as wide, tapering to a cuneate or rounded base, acutely acuminate at apex, the acumen 0.5-2.5(-3) cm long ; with 15-25(30) pairs of distinct, parallel, main lateral nerves ; hirsute when young, glabrescent, more densely hairy on main nerves and there longer persistent, midrib and main laterals prominent both sides.

Flowers fasciculate in the axils of the leaves or of fallen leaves ; pedicel 3-5 mm long, hirsute ; sepals green-yellow, free, narrowly oblong-triangular, 4.5-7 × 1.5-2 mm, brown-hirsute outside ; corolla white, sub-cylindrical, 4.5-7.5 mm long, glabrous ; lobes subquadrate to oblong, 1.5-2.5 mm long, obtuse to rounded at apex, the tube 3-5 mm long. Male flowers : stamens inserted on the tube at 1.5-2(-4) mm height, glabrous, anthers connivent around the style, extrors, 1.5-2.2 mm long ; pistilode 3-5 mm long, ca. as long as the corolla, ovary with stiff erect 1.5-2 mm long hairs, style glabrous,

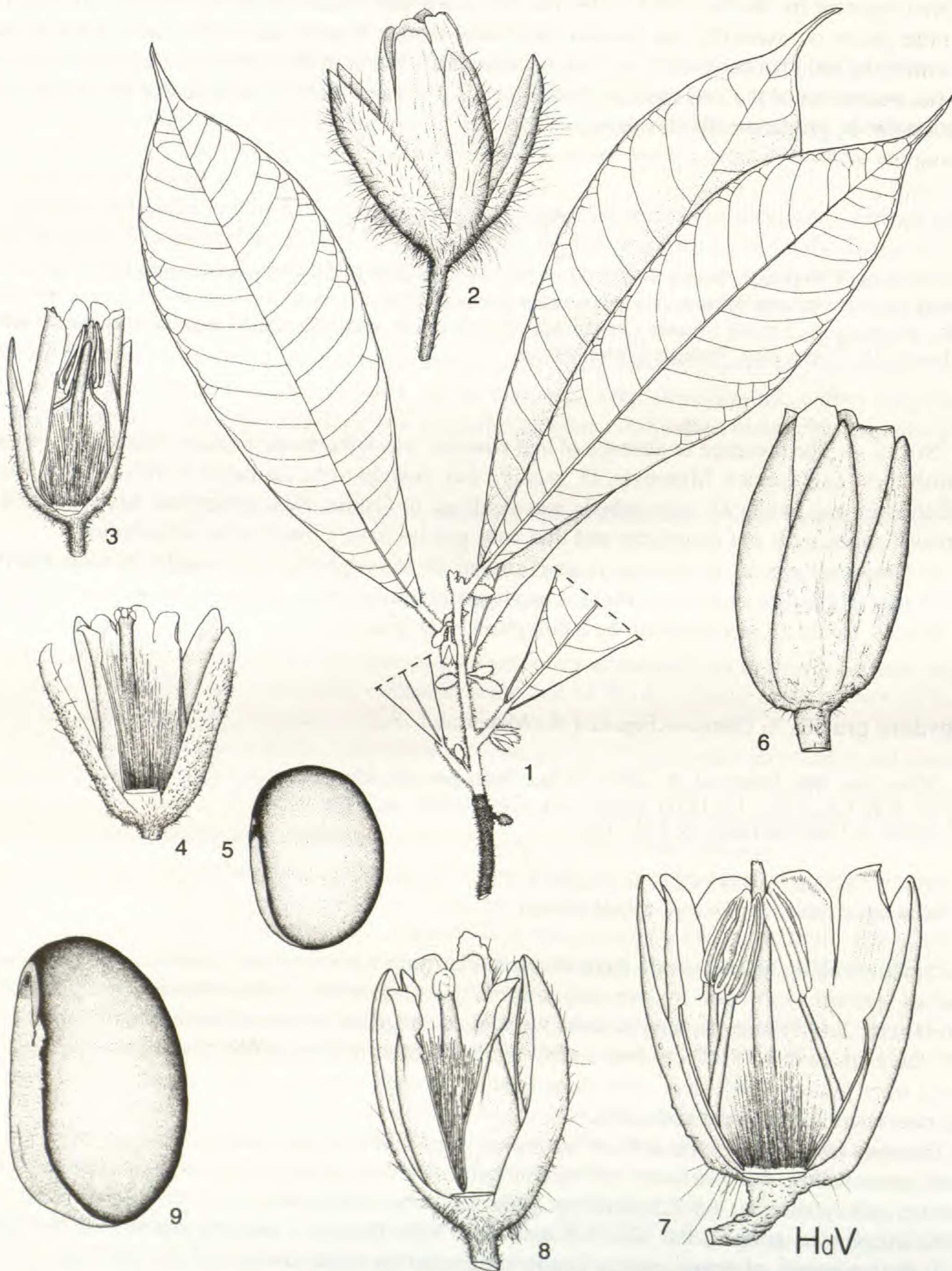
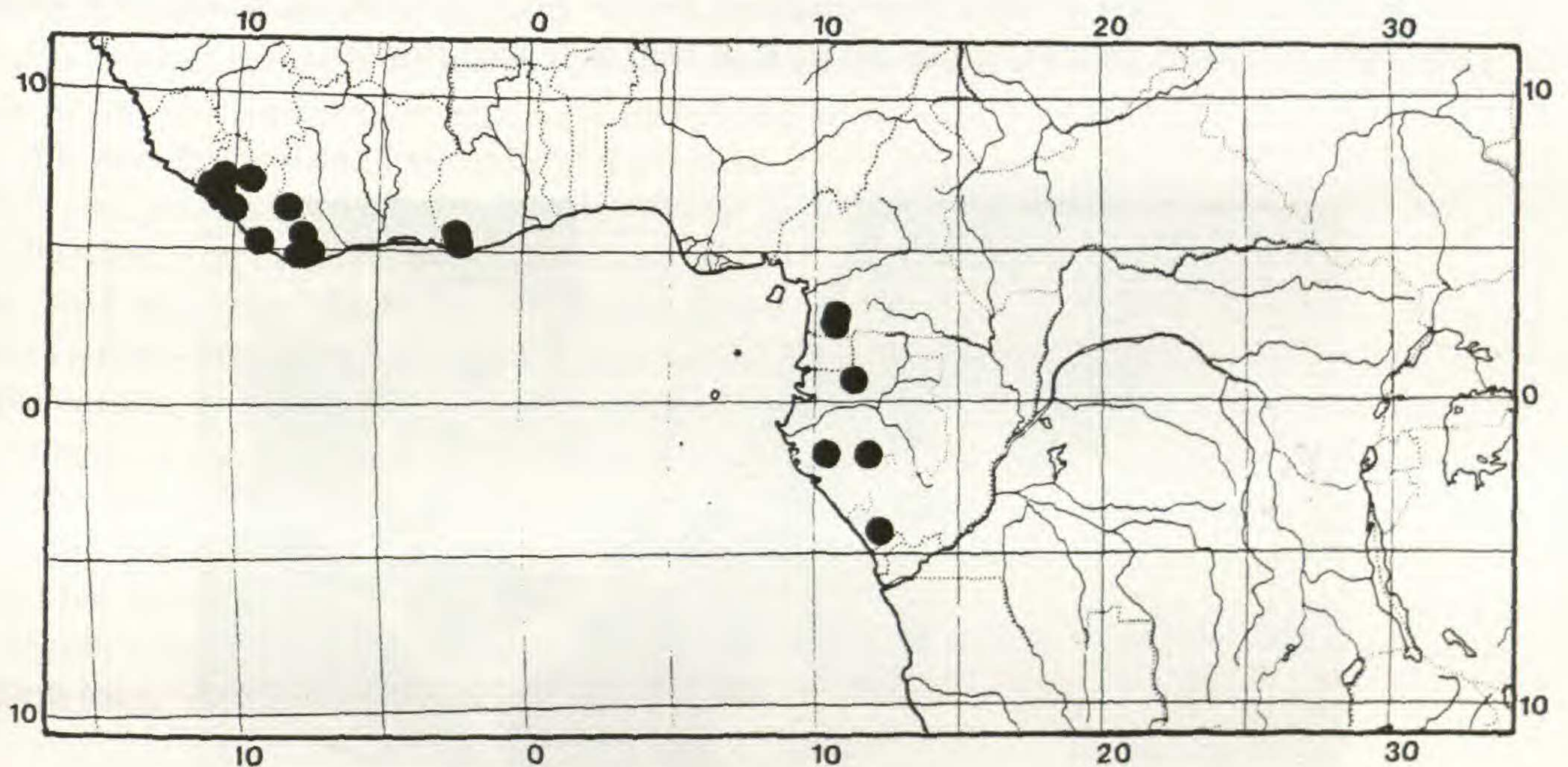


Fig. 1. — *Delpydora gracilis* A. Chev. : 1, flowering branchlet $\times 1/2$; 2, flower $\times 4$; 3, male flower in longitudinal section $\times 4$; 4, female flower in longitudinal section $\times 4$; 5, seed $\times 2$. — *Delpydora macrophylla* Pierre : 6, flower $\times 4$; 7, male flower in longitudinal section $\times 4$; 8, female flower in longitudinal section $\times 4$; 9, seed $\times 2$. (Jansen 2174 : 1-2 ; 2121 : 4 ; Louis et al. 883 : 3 ; Le Testu 5102 : 5 ; 6005 : 8 ; Bos & Breteler 3101 : 6-7 ; J. J. de Wilde et al. 61 : 9). Drawing by HANS DE VRIES.

rounded at apex, without stigmas. Female flowers : as the male but without stamens (or staminodes) ; pistil as in the male flower but with larger ovary with 2.5-3 mm long hispid hairs ; style glabrous, apically with 5 stigmas.

Fruit red at maturity, depressed subglobose, 1.6-3.5 × 2-4 cm (without hairs), densely to sparsely brown-hirsute to hispid, hairs 3-5 mm long, white inside, up to 5-seeded. Seeds brown, subellipsoid, subtriangular or not in transverse section, 12-16 × 10-14 mm, hilum linear, up to 15 mm long ; testa subcoriaceous to pergamentaceous.



Map 1. — Distribution of *Delpyhora gracilis* A. Chev.

DISTRIBUTION. — Cameroun, Congo, Côte d'Ivoire, Gabon, Ghana, Liberia.

ECOLOGY. — Rain forest. Altitude 0-700 m.

SPECIMENS EXAMINED. — CAMEROUN : *Letouzey* 9468, Mbanga, km 81 Kribi-Ebolowa, fl., juv. fr. April (P) ; *Nkongmeneck* 383, 12 km S.W. of Nyabessan, fl. Nov. (P). — CONGO : *Farron* 4905, Kakamoeka, fl. Jan. (P). — CÔTE D'IVOIRE : *Chevalier* 19583, between Loula and Nekaougnié, fl. July (K, P, type) ; 19672, Grabo, fl. b. July (P) ; *Guillaumet* 975, Olido, fl. (BR). — GABON : *Le Testu* 5102, Echiras, fl., fr. Nov. (BM, P) ; *Louis, Breteler & de Bruijn* 417, Oveng, juv. fr. Nov. (WAG) ; 883, Mouyanama, 27 km E. of Mimongo, fl. Nov. (WAG). — GHANA : *Enti* 2119, Neung F.R., fl. Sept (BR, K, WAG) ; 2263, juv. fr. Nov. (WAG) ; *Vigne* 1973, Simpa, juv. fr. May (K) ; 3083, Prestea, fl., fr. Sept. (K) ; 2806, *sin. loc.*, fl. b. (BR). — LIBERIA : *Baldwin* 6275, Yratoke, fl. b. July (K) ; 6715, Gbawia, fl. July (K) ; 10383, Boporo, fl. b. Nov. (K) ; 10481, Suen, fr. Nov. (K) ; 10804, Mecca, juv. fr. Dec. (K) ; 11281, Cess R., fr. March (K) ; *Cooper* 29, Dukwai R., juv. fr. Oct/Nov. (K) ; 46 (K) ; 175, fr. Febr. (K) ; *Harley* 1503, Firestone Plant., fr. April (K) ; *Jansen* 1100, 20 miles N. of Sinoe, fr. Jan. (WAG) ; 1627, 15 miles E. of Kakata, fr. Febr. (WAG) ; 2121, 10 miles Tchien-Cape Palmas, fl. July (WAG) ; 2174, 10 miles S. of Kakata, fl. Aug. (WAG) ; *Leeuwenberg* 4883, 9 miles E. of Yoma, fl. Aug. (WAG) ; *Linder* 577, Gbanga, fl. b. Sept. (WAG).

NOTES. — HUTCHINSON & DALZIEL (*l.c.*) and HEINE (*l.c.*) both described the habit of this species as a shrub or (small) tree. However, all the material examined by the present authors, which includes the specimens cited in both editions of the Flora of West Tropical Africa, originated from shrubs no greater than 1.80 m tall.

All the specimens from Upper Guinea lack ant pouches. Of the 6 specimens from Lower Guinea only 2 show distinct ant pouches : *Le Testu 5102* from Gabon and *Farron 4905* from Congo. The specimens *Baldwin 11281* from Liberia, *Enti 2119* from Ghana and *Louis et al. 417* from Gabon, show something that might be considered as a poche primordium, namely a strongly revolute leaf margin near base, which in these specimens, however, has not developed into a true pouch.

Of the 30 collections cited 14 have been analysed for the description of the flowers. Of these 7 proved to be male, 5 female, and two contained male as well as female flowers.



Fig. 2. — *Delpydora macrophylla* Pierre : top of leafy shoot. (*Breteler 12026*). Photograph by F. J. BRETELER.

***Delpyhora macrophylla* Pierre** — Fig. 1, 6-9, 2 ; Map 2.

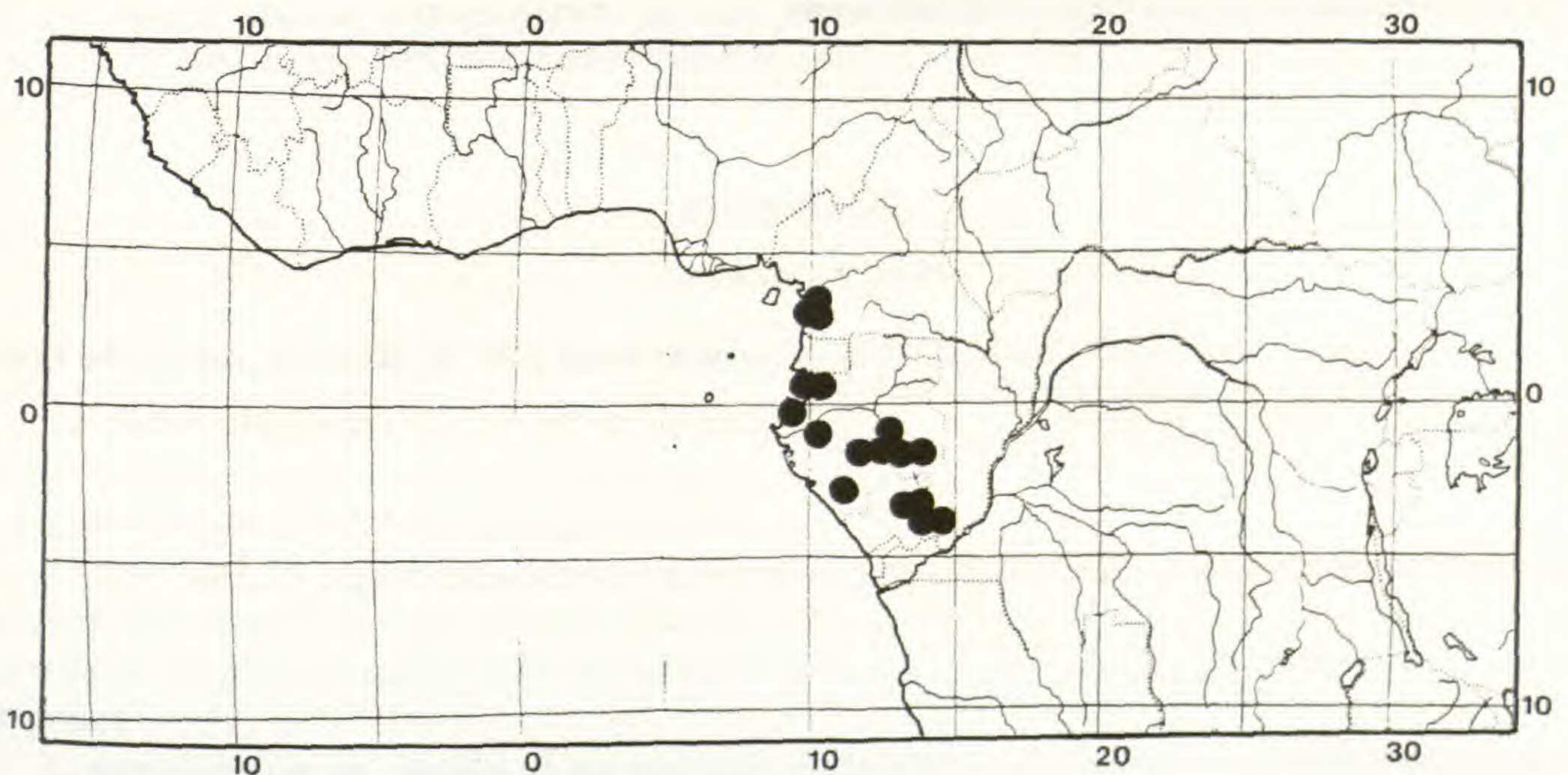
Bull. Soc. Linn. Paris 2 : 1277 (1896) ; ENGLER, Monogr. Afr. Pflanzenf. 8 : 50 (1904) ; AUBREVILLE, Flore Gabon 1 : 136 (1961) ; WALKER & SILLANS, Pl. Utiles Gabon : 391 (1961).

TYPE : *Klaine 436*, Gabon, near Libreville (holo-, P ; iso-, BR, K).

Slender, not or scarcely branched shrub or treelet up to 7 m tall. Branches and branchlets hirsute. Leaves usually with two ant pouches at base ; petiole 5-10(-23) m long, hirsute, grooved above ; blade oblanceolate, (10-)25-42(-78) × 5-16(-20) cm, (2.5-)3-4(-5) times as long as wide, acutely acuminate and often tailed at apex, the acumen (with tail) (0.5-)1.5-2.5(-5) cm long ; with (22-)26-43 pairs of parallel, distinct, main lateral nerves ; hirsute when young, glabrescent with age, more densely hairy on main nerves and there longer persistent, midrib and lateral nerves prominent both sides.

Flowers fasciculate in the axils of the leaves or of fallen leaves ; pedicel 2-6.5 mm long, hirsute ; sepals pale green-yellow, free, narrowly oblong - triangular, 10-12 × 2-3 mm, brown-hirsute outside ; corolla white, sub-cylindrical, 9-13 mm long, the lobes oblong, top obtuse to acutish, 3.5-5 × 1.5-3 mm, tube 5-8.5 mm long. Male flowers : stamens inserted on the corolla tube 2-4 mm from its base, glabrous ; anthers connivent around the style, extrors, 3-5 mm long ; pistillode 7.5-9.5 mm long, ca as long as the corolla, ovary with 2-3 mm long hairs, style glabrous, stigmas absent, the top of the style may be rounded or lobulate ; female flower as the male flower, but without stamens no staminodes ; pistil as in the male flower, but with larger ovary with 5-6 mm long hairs, and style top with 5 stigmas.

Fruit subglobose (1.5-)2-3.5 cm in diameter (without hairs), up to 5-seeded, long-hirsute to somewhat hispid, usually densely so, hairs 5-7 mm long, rusty to pale-brown. Seed subellipsoid, 13-25 mm long, 9-13 mm in diameter, more or less triangular in transverse section, the hilum linear up to 2 cm long. Seedcoat thinly coriaceous to permentaceous.



Map 2. — Distribution of *Delpyhora macrophylla* Pierre.

DISTRIBUTION. — Cameroun, Congo, Gabon.

ECOLOGY. — Rain forest. Altitude 0-800 m.

SPECIMENS EXAMINED. — CAMEROUN : *Bos* 4955, 15 km S.E. of Kribi, fr. June (BR, K, P, WAG) ; 5409, Kribi, fl. Sept. (WAG) ; 5423, fl. Sept. (BR, K, P, WAG) ; 7096, fl. b. July (WAG) ; *Bos & Breteler* 3103, 6.5 km S. of Kribi, fl. Oct. (P, WAG) ; *Breteler* 12026, Elephant Mt. E. of Kribi, fr. Febr. (WAG) ; *Leeuwenberg* 5542, 60 km S. of Edéa, fl. May (BR, K, P, WAG) ; *Letouzey* 9398, 30 km E.S.E. of Kribi, ster. April (P) ; 12314, 20 km N. of Eséka, fl. Dec. (P). — CONGO : *Bouquet* 579, Bangou Forest, fl. Oct. (P) ; 1789, Ndoumou Mt. near Mandili, fr. Oct. (P) ; *Farron* 4372, 25 km W. of Sibiti, ster. Aug. (P) ; *F. Hallé* 1606, M'Bila Forest, fr. Febr. (P) ; *Koechlin* 2464, Massangi, fr. Jan. (P). — GABON : *Bernard SRF* 508, Equata, ster. Aug. (P) ; *Breteler* 6518, km 23 Moanda-Mbinda, fl. b. Sept. (WAG) ; 6740, km 30 Moanda-Bakoumba, fl. Oct. (WAG) ; *Chevalier* 26862, near Kango, fl. Oct. (P) ; *de Wilde et al.* 61, Kinguélé Falls, fr. Jan. (LBV, WAG) ; *de Wilde, Arends & de Bruijn* 8842, juv. fr. Nov. (BR, LBV, P, WAG) ; *de Wilde, Arends, Louis & Wieringa* 9929, 7 km S.E. of Franceville, fl. fr. Dec. (WAG) ; 10064, Kinguélé Falls, fl. fr. Dec. (WAG) ; *N. Hallé* 1526, 18 km E. of Libreville, ster. April (P) ; 2071, Ezanga Lake, fr. May (BR, K, P) ; *N. Hallé & Villiers* 4613, Kinguélé Rd., ster. Jan. (P) ; *Klaine* 246, near Libreville, fl. fr. Nov. (K, P) ; 436, fl., fr. June (BR, K, P, type) ; 2055, fl. Dec. (K, P) ; *Le Testu* 1885, Tchibanga, fl. Nov. (BM, P) ; 6005, Ghénzambwé, fl. July (BM, P) ; 7774, Ngoma, fl. Dec. (BM, P) ; 8349, Iméno, fl. Sept. (BM, BR, K, P) ; 8800, Maouya, fl. May (BM) ; *Louis* 99, 7 km Kougouleu-Medouneu, fl. Nov. (LBV, WAG) ; *Louis, Breteler & de Bruijn* 255, 24 km N.E. of Ntoun, fl. Nov. (WAG) ; *Nzabi* 57, 10 km Kougouleu-Medouneu Rd., ster. May (LBV, WAG) ; 58, 7 km Kougouleu-Medouneu Rd., ster. May (LBV, WAG).

NOTES. — *Le Testu* 6005 is the only specimen of this species without ant pouches. This means that the usual condition is with ant pouches just the opposite as in *D. gracilis*.

For the flower description 13 specimens have been analysed. Of these 7 were male, 3 female, and 3 proved to have both male and female flowers.

ACKNOWLEDGEMENTS : We wish to thank Mr. R. W. DEN OUTER and Mr. W. L. H. VAN VEENENDAAL of the department of Plant Cytology and Plant Morphology, Wageningen, for their anatomical investigation of the lactifers in *Delpyhora macrophylla*. Mr. A. N'GOYE of the Institut de Recherche en Ecologie Tropicale, Libreville, is kindly acknowledged for his assistance in the field work.

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Structure spécifique d'une végétation sahélienne. Cas de Wiidu Thiengoli (Ferlo, Sénégal)

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Résumé : Cette étude se propose d'établir les fluctuations spatio-temporelles d'une végétation sahélienne à proximité de Wiidu Thiengoli, à partir d'une série d'observations floristiques. Les données, traitées par des méthodes d'analyses multivariées, font apparaître une forte variabilité de la composition floristique et un effet rémanence, qui est d'autant plus important que l'année de référence est exceptionnellement sèche ou humide. La comparaison des relevés floristiques de stations proches du forage par rapport à des sites éloignés permet d'évaluer la réponse du système aux perturbations zoo-anthropiques.

Summary : The structure of the herbaceous forest layer around Wiidu Thiengoli drilling site has been studied for a fifteen-year-period to determine spatial structure floristic composition. The data was analysed, using multidimensional methods (Factorial analysis of correlation) and showed high variability in floristic composition and a "memory effect". This latter is more important when the reference year is exceptionally dry or wet. Comparison of floristic sampling among sites near the drilling (highly disturbed) with sites farthest away (undisturbed) showed that there are specific floristic composition changes correlated with zoo-anthropic disturbance.

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INTRODUCTION

Le Sahel, situé entre 13° et 18° de latitude nord, se trouve confronté aux grands problèmes de développement liés à la croissance démographique, au déficit structurel de la production vivrière et à la dégradation des conditions écologiques (GROUZIS, 1988).

L'économie des régions sahéliennes *sensu stricto*, où l'agriculture est marginale, est basée sur les activités pastorales. L'élevage, de type extensif, exploite les pâturages naturels. L'éleveur, ne pouvant pas trouver sur place en toute saison la nourriture nécessaire à son troupeau, transhume sur d'immenses territoires.

L'accroissement du cheptel et les activités anthropiques associés aux conditions de sécheresse intense engendrent des perturbations parfois profondes des systèmes écologiques sahéliens, par ailleurs